

(19) World Intellectual Property  
Organization  
International Bureau



(43) International Publication Date  
7 July 2005 (07.07.2005)

PCT

(10) International Publication Number  
**WO 2005/060995 A2**

(51) International Patent Classification<sup>7</sup>: **A61K 39/02**

(21) International Application Number:  
PCT/GB2004/005441

(22) International Filing Date:  
23 December 2004 (23.12.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
0330007.6 23 December 2003 (23.12.2003) GB

(71) Applicant (for all designated States except US): **IMPERIAL COLLEGE INNOVATIONS LIMITED** [GB/GB]; Sherfield Building, Imperial College, London SW7 2AZ (GB).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **TANG, Christoph, Marcel** [GB/GB]; Center for Molecular Microbiology and Infection, Department of Infectious Diseases, Flowers

Building, Armstrong Road, Imperial College London, London SW7 2AZ (GB). **LI, Yanwen** [GB/GB]; Center for Molecular Microbiology and Infection, Department of Infectious Diseases, Flowers Building, Armstrong Road, Imperial College London, London SW7 2AZ (GB).

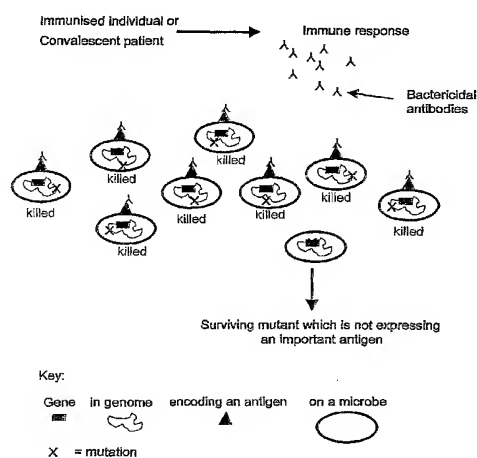
(74) Agent: **MILES, John**; Eric Potter Clarkson, Park View House, 58 The Ropewalk, Nottingham NG1 5DD (GB).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO,

[Continued on next page]

(54) Title: VACCINES



(57) Abstract: A method for identifying a polypeptide of a microorganism which polypeptide is associated with an immune response in an animal which has been subjected to the microorganism, the method comprising the steps of (1) providing a plurality of different mutants of the microorganism; (2) contacting the plurality of mutant microorganisms with antibodies from an animal which has raised an immune response to the microorganism or a part thereof, under conditions whereby if the antibodies bind to the mutant microorganism the mutant microorganism is killed; (3) selecting surviving mutant microorganisms from step (2); (4) identifying the gene containing the mutation in any surviving mutant microorganism; and (5) identifying the polypeptide encoded by the gene. The polypeptide identified or a variant or fragment thereof or a fusion of these is useful in a vaccine. The polypeptide may be a polypeptide comprising the amino acid sequence selected from any one of SEQ ID Nos 2, 4, 6, 8, 10, 12, 14, 16, 18, 25 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52, 54, 56; or a fragment or variant thereof or a fusion of such a fragment or variant, and is useful in a vaccine against *Neisseria meningitidis*.



WO 2005/060995 A2



SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

**Published:**

— *without international search report and to be republished upon receipt of that report*